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# The Tail Wind

Boston CWSU Quarterly Newsletter



## Welcome to the Inaugural Edition of The Tail Wind

This newsletter has been in the works for quite a while. With the help of one of our current student volunteers, Erin Rinehart, The Tail Wind has finally become a reality. It is our hope that this newsletter will help to educate (and entertain) the reader about aviation weather.

### Save the Date!

ICG TDA

1 Nov

Boston icing TDA started  
1 Nov. Will be posted  
daily 830am & 1130am.

1<sup>st</sup> Day of Winter

21 Dec

Get ready for cold weather  
and snow. Winter is  
coming.

## Inside this Issue!

What is a CWSU?	2
Welcome Back Icing TDA	2
Common Icing Locations	3
Meet the Forecasters	4
My Experience at the Boston CWSU	5
Forecasting Winter Weather – Tips and Tricks	6
E-Brief: We Need Your Help!	8
Jokes!	9



## What is a CWSU?

By Scott Reynolds

The Center Weather Service Unit (CWSU) at Boston Air Route Traffic Control Center (ZBW ARTCC) is a part of the National Weather Service (NWS), and provides meteorological support to the ARTCC and other FAA facilities throughout ZBW airspace. While our “primary” customers are the ARTCC’s Traffic Management Unit (TMU), we provide weather support to the entire ARTCC. We deliver several scheduled briefings per day to ARTCC personnel, with on-demand briefings given at any time. However, we’re not just about supporting ARTCC operations.

We also provide on-demand briefings to the Boston TRACON (Terminal Radar Approach Control (A90)). We also provide support to the Cape Approach (K90), especially during the busy summer flying season, and other FAA facilities throughout New England and eastern New York as requested. Additionally, we provide a number of other forecast “products” that are available via our webpage (<http://www.erh.noaa.gov/zbw>)

CWSUs were created in the late 1970’s as a result of National Traffic Safety Board findings from the 1978 crash of Southern Airways Flight 242 near Atlanta, GA. Today each CWSU has a staff of four NWS meteorologists providing support to each of the 21 ARTCCs.

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## Welcome Back Icing TDA!

CWSU Boston provides a tactical decision aide for snow and ice for Logan Airport and Boston Approach airspace from 1 November through 1 April. This forecast concentrates on the afternoon/evening “rush” for Boston (roughly 4pm-10pm). Freezing levels for the area at 3-hour intervals, icing forecasts for the three primary approach points for Boston (Providence, Gardner, SCUPP), and a snow and ice accumulation forecast for Boston itself. These forecasts will be updated around 830am and 1130am on a daily basis.

## Common Icing Locations

Review of results from: Bernstein, Ben C., Tiffany A. Omeron, Frank McDonough, and M. K. P., 1997: The Relationship between Aircraft Icing and Synoptic-Scale Weather Conditions. 742–762.

### Precipitation Type

The most common precipitation type when icing PIREPS were reported was snow and rain was a close second (Fig. a). When the data was normalized to take into consideration areal extent of each precipitation type vs. the number of PIREPS, the type of precipitation with the highest threat for icing was freezing rain/drizzle and ice pellets (Fig. b). It was found that transition zones between snow and rain were most likely to contain icing.

### Cloud Cover

The most common cloud cover when icing was reported, but no precipitation was falling, as seen from the surface was overcast. There was a gradual decrease in icing PIREPS as the sky cover decreased. When no sky condition was reported do to an obscuration of the sky, the threat of icing aloft was highest.

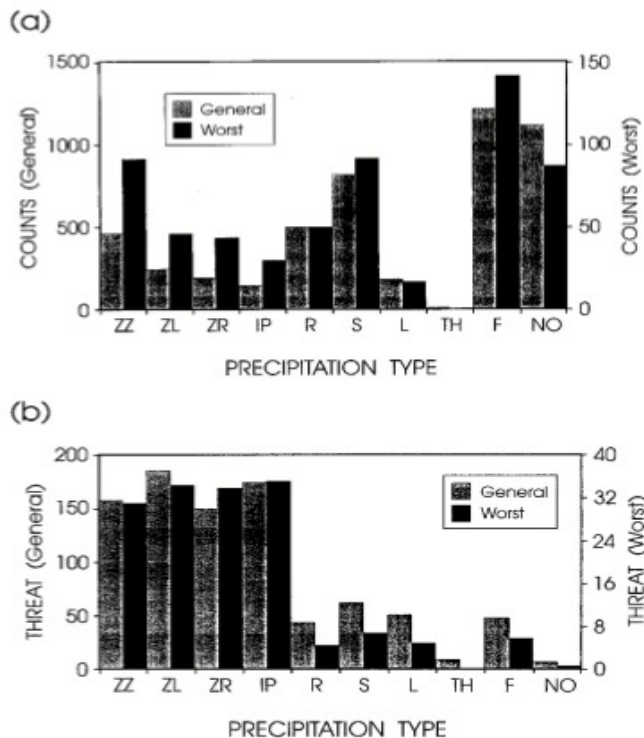
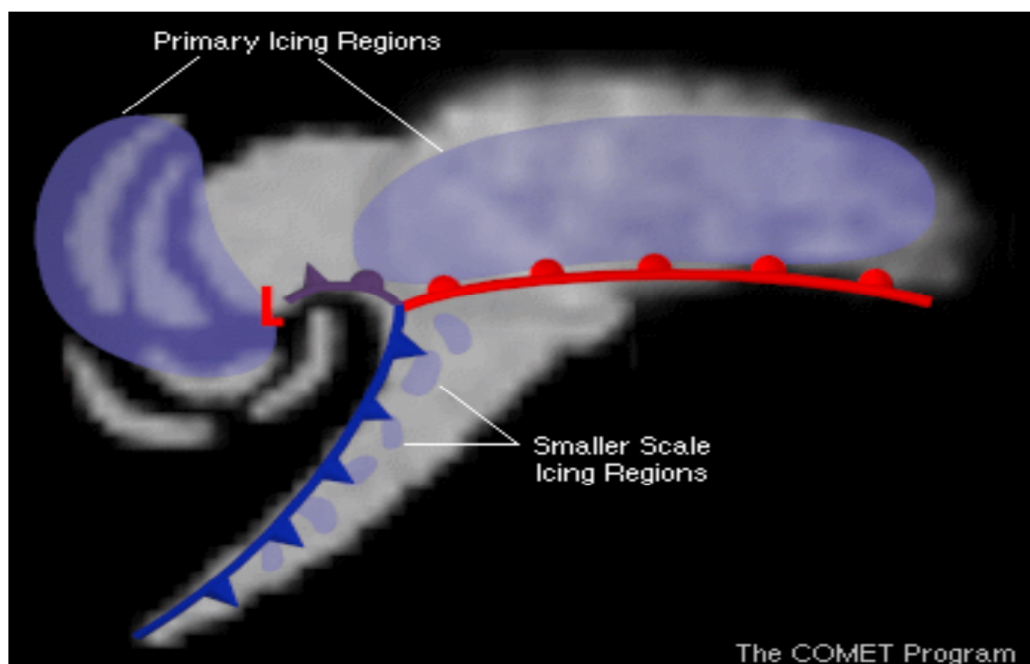


FIG. 6. (a) Number and (b) threats (counts/areal extents, PIREPs/10<sup>6</sup> km<sup>2</sup>) of general (gray columns) and worst (black columns) PIREPs matched to precipitation types.

### Cyclone Sectors

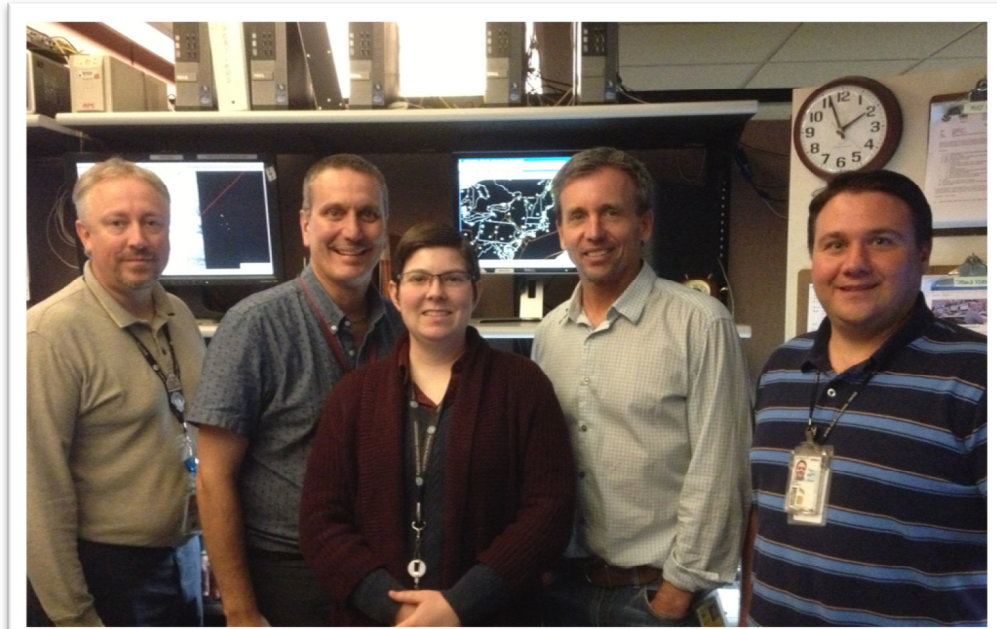
Based on the cyclone sectors in the figure below, the most common location for icing was behind arctic fronts. When the data was normalized to account for the areal extent vs. the number of PIREPS, the data showed that ahead (on the cold side) of a warm front had the highest threat for icing.



## Meet the Forecasters and Intern

### Scott Reynolds

After spending 10 years at the New York City/Long Island Weather Forecast Office (WFO), Scott joined the Boston CWSU in 2005 as meteorologist in charge. Scott's favorite weather phenomena are lake effect snow and inland remnants of tropical systems. In his free time, Scott is involved with youth baseball and soccer, and is a NH SKYWARN coordinator for amateur radio.



*From left to right: Scott Reynolds, Brian Seeley, Erin Rinehart, Weir Lundstedt, Michael Abair.*

### Brian Seeley

Brian is a 25 year veteran of the NWS and spent 18 years at the WFO in Puerto Rico before joining the Boston CWSU in 2013. Brian's interest in weather began as a child watching snow storms, though now he has an interest in hurricanes as well. Outside work, Brian enjoys working in the yard, spending time with his wife and two kids, and watching NASCAR.

### Weir Lundstedt

Weir has been with the NWS for over 25 years and started his career in Concord NH. In 1992 he joined the Boston CWSU. Weir chose meteorology as his career path because he is interested in how weather influences our daily living and the power it has over our lives. When he's not in the office, Weir enjoys outdoor activities such as golfing, surfing, and skiing.

### Michael Abair

Mike began his career as a forecaster in the private sector. He joined the NWS in 2004 at the Cleveland WFO and moved to the Boston CWSU in 2013. His favorite weather phenomena are blizzards and winter weather. In his spare time, Mike enjoys reading, home improvements, and especially activities with his two kids.

### Erin Rinehart

Erin is a master's student at Plymouth State University and a student volunteer at the Boston CWSU. She spent the last 8 years forecasting for the US Air Force and MA ANG. Her passion for weather began at an early age when she and her grandparents had a close encounter with a tornado. To this day she loves severe weather forecasting. When not studying, Erin enjoys reading, watching documentaries, and board games with family and friends.

# My Experience at the Boston CWSU

By Jacob Fedors

I started my internship at the Boston CWSU in Nashua, NH in mid-September 2013. Being from Plymouth State University, I fit in pretty well with the two Plymouth State graduates who work there, Brian Seeley and Scott Reynolds. For the first few weeks I shadowed the forecasters, helping them make maps for briefings and learning about Bufo. The biggest part of my learning experience was the jump to aviation forecasting. I have had a ton of practice with making forecasts for the general public but never for aviation, so because it was new and is higher risk it really caught my interest. Forecasting icing levels and turbulence was new to me but it was also exciting at the same time. It was neat to learn how weather events that had only a minor impact of everyday people had a large impact on aviation. Each morning we would go outside to take the observation.

I was also given the chance to spend some time with the air traffic controllers to see what their workday consisted of. I learned how the ZBW airspace was divided up into sections and how each section was subdivided into smaller sections and flight levels. A pair of people controls each of

those smaller sections and flight levels. I also learned what it is like to be in a work environment that focuses on operational meteorology. I have been in professional work environments before but never one that incorporated my field of study. It was great to learn how the forecasting was done and what regulations and requirements had to be met. It was also interesting to see how the forecasters would respond to help air traffic control during a significant weather event or when a piece of equipment, like AWIPS, was down. Overall it was definitely a valuable experience that gave me skills and knowledge that I will be able to apply after graduation.



# Fall Has Come to the White Mountains

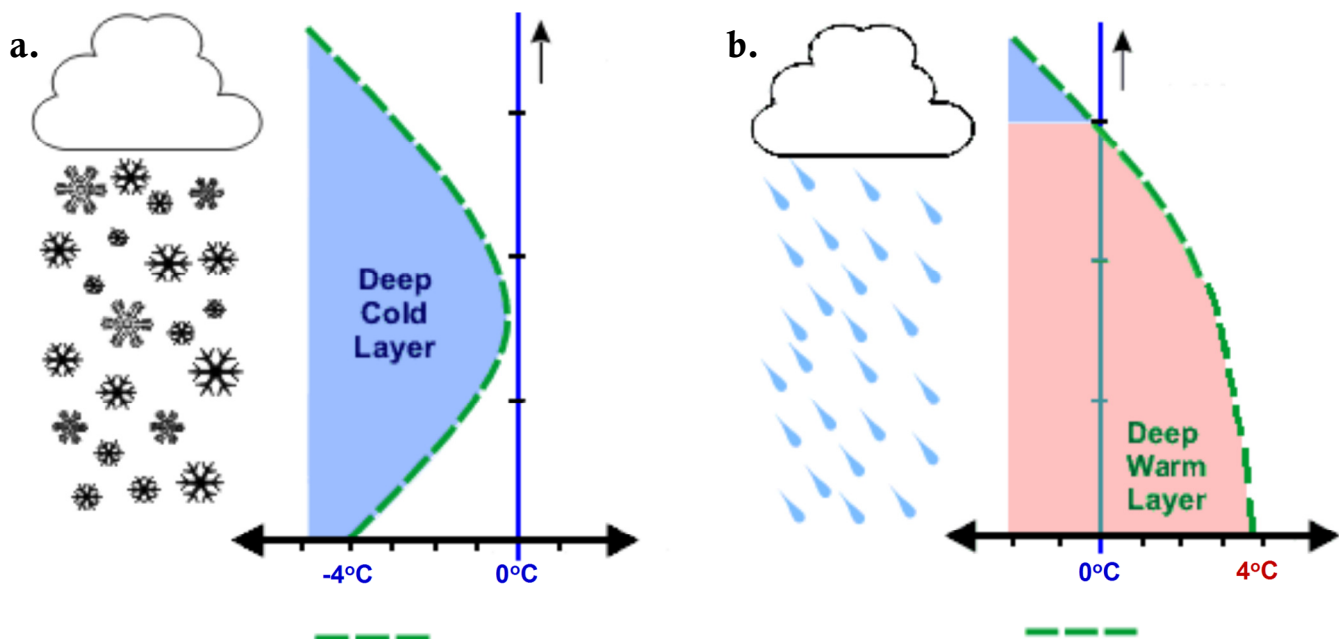


## Forecasting Winter Weather – Tips and Tricks

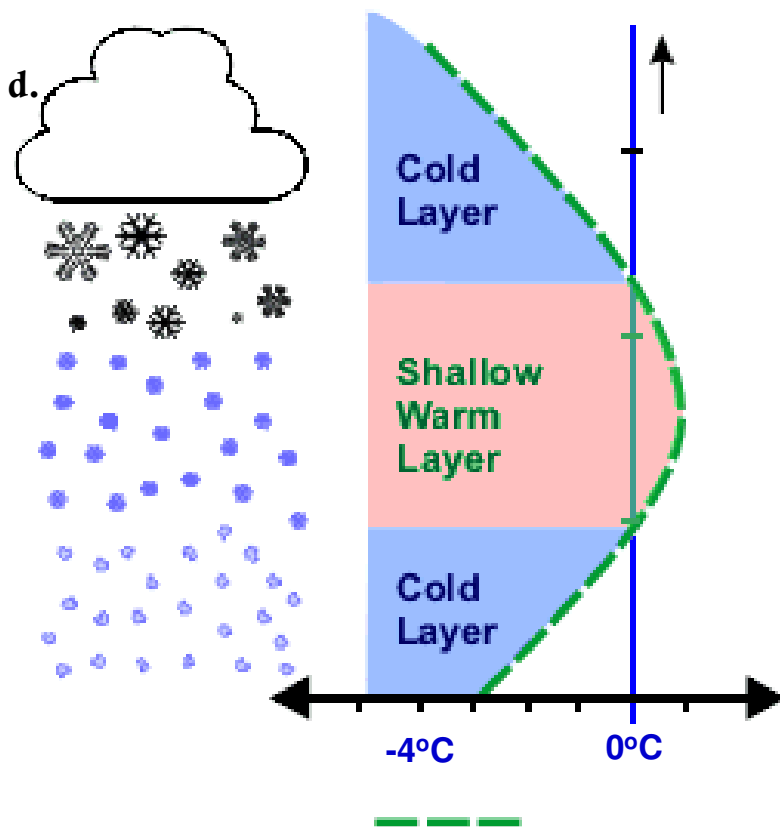
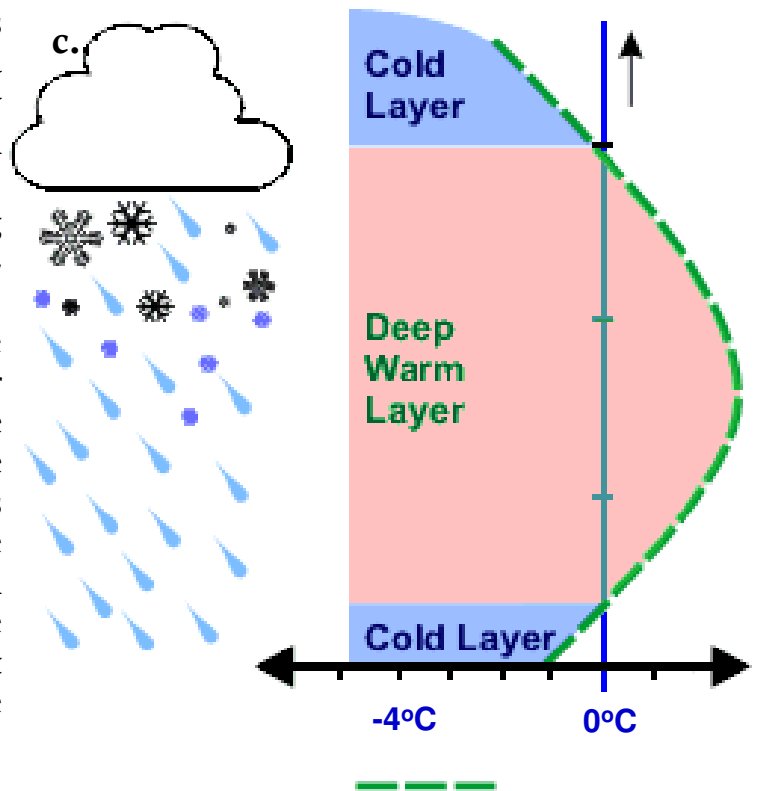
Forecasting fall weather can be a challenge for any forecaster. Sometimes the difference between snow and rain can be just a few degrees. Some of the most hazardous weather, freezing rain, can occur with just a minute temperature difference. One town will get rain or snow, while the town next door will have freezing rain. With a few simple rules of thumb, forecasting these mixed precipitation events becomes far less difficult.

When it comes to deciding the type of precipitation to forecast, vertical temperature profiles are a forecaster's best friend. These diagrams allow forecasters to see the temperature change as altitude increases, which paints a thermal picture of the atmosphere at a given location. By determining how much of the column of atmosphere is below freezing, and at what levels, a forecaster can conclude what type of precipitation will occur.

Rain and snow are relatively simple to forecast using a vertical temperature profile. If the entire depth of the atmosphere is below freezing, the precipitation type will be snow (Fig. a). Alternately, if there is a deep layer of above-freezing air at the surface, the precipitation type will be rain (Fig. b). Typically, a good rule of thumb is that if the freezing level is at least 1200ft, the precipitation type will likely be rain. If the models are correctly forecasting temperatures, soundings are an easy way to quickly forecast precipitation type. Otherwise, the forecaster will have to determine how the model is wrong and compensate for it before using the sounding to determine precipitation type.





Freezing rain is one of the most dangerous precipitation types for both aviation and general daily living. As such, accurately predicting freezing rain is important for all meteorologists in the forecasting business. When there is a deep layer of above-freezing temperatures aloft with a shallow below-freezing surface layer (less than 2500ft), freezing rain is likely to occur (Fig. c). The precipitation may begin as either snow or rain aloft but ultimately becomes rain in the warm layer. When the rain falls into the shallow cold layer at the surface it becomes super-cooled but does not have time to refreeze before impacting the surface. When the super-cooled rain hits objects at the surface (trees, power lines, cars, roads) it freezes on impact and causes a layer of ice to form.



Ice Pellets occur in a similar manner as freezing rain, but are a much less dangerous phenomenon. In the case of ice pellets, the above-freezing layer aloft is shallower than with freezing rain while the cold layer at the surface is deeper. A general rule of thumb is that the cold layer must be at least 2500ft deep (or 750m). As frozen precipitation (usually snow) falls into the warm layer, melting occurs and the flakes partially melt. Once the partially melted precipitation falls into the deeper cold layer, it refreezes entirely into ice pellets. Additionally, if the temperature of the cold layer at the surface is less than  $-10^{\circ}\text{C}$ , the droplets could reform into snow.

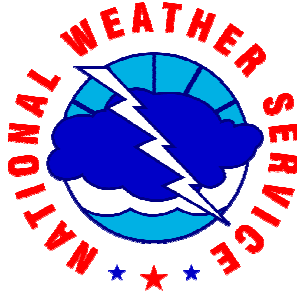
# E-Brief: We Need Your Help!

 <b>CWSU ZBW</b> <b>WEATHER BRIEFING</b> 											
ISSUED:	1255Z	FRI SEP 19, 2014				EXPIRATION TIME:		192000Z	ER/ABE		
<b>HAZARD OCCURRING OR FORECAST DURING THE VALID TIMES ABOVE.</b> <b>PILOT REPORTS REQUESTED.</b> <i>For additional info, see the CWSU ZBW web page at <a href="http://www.erh.noaa.gov/zbw">http://www.erh.noaa.gov/zbw</a>.</i>											
HAZARD	ARTCC AREA					TRACON		SUMMARY OF HAZARD			
	A	B	C	D	E	A90	K90				
ICING								NO SGFNT ICE. FRZLVL 020-060 N TO 060-100 S.			
TURBULENCE BLW 150		X	X	X	X	X	X	E OF A YSC-ALB-HUO LN...SCT LGT-MOD TURB BLW 080 SPCLY OVR ME AND ISOL LGT-MOD TURB BLW 080 FOR SMALLER ACFT E OF LN.			
TURBULENCE ABV 150	X	X		X				N OF A SYR-PSM LN...OCNL LGT-MOD TURB FL280-400 DVLPG AFT 16Z.			
TSTMS								NONE.			
PRECIPITATION								NONE.			
CEILINGS BLW 050 and/or VIS AOB 3SM								DISSIPATING VALLEY FOG OVR CNTRL NEW ENG...OTRW NO SGFNT CIG/VIS ISSUES.			
JET STREAM FORECAST	NW WINDS BCMG MORE N SPCLY OVR NRN ZBW WITH MAX WINDS 60-100KT FL250-400 OVR NRN HALF OF ZBW.										
OTHER WX CONCERNS	NONE.										
ARTCC/TRACON OUTLOOK 192000Z-201200Z	20Z-00Z SPCLY OVR NRN/NE ZBW...CONT OCNL MOD TURB FL280-400. ISOL MOD- SEV POSS FOR SMALLER ACFT. OTRW VFR THRU THE PD WITH AREAS OF IFR FOG OVR MTNS OF NRN ZBW LATE TONIGHT.										
BOS WIND OUTLOOK	TODAY		SAT 9/20		SUN 9/21		MON 9/22		TUE 9/23		
PREVAILING DIRECTION	N-NE THEN SEA BREEZE		S-SW		MNLY SW		BCMG NW		W		
SPEED (10 KT)	AROUND		GREATER THAN		AROUND		GREATER THAN		AROUND		

The E-Brief is a general weather briefing sheet that is issued at least three times per day: around 0800, 1600, and 2030 local time. The briefing sheet is broken down by weather element and by ARTCC area or TRACON airspace (at this time, A90 and K90 only). The weather elements included are icing, high and low level turbulence, precipitation, thunderstorms, and ceilings below 5000 feet/visibilities below 3 miles.

Our emphasis is on the next 6-9 hours, with an outlook extending out to 24 hours. Part of the driving force behind this was for defining areas where air traffic controllers would need to solicit pilot reports (PIREPs) in order to fulfill FAA requirements.

The forecasters here at the CWSU want to make sure our product is tailored to suit your needs. Please stop by the forecasting desk or email us with comments and critiques on how we can better serve your needs with the daily E-Brief.



## Boston Center Weather Service Unit

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Website: <http://www.erh.noaa.gov/zbw/>

Center Weather Service meteorologists provide weather support and consultation to FAA air traffic managers and controllers. Rerouting of aircraft around hazardous weather is based largely on forecasts provided by the CWSU meteorologist.

Meteorologist in Charge  
Scott Reynolds

Editor  
Erin Rinehart

## Jokes!

What is it called when high pressure goes on vacation?

A Hiatus

Where did the meteorologist stop for a drink on the way home from a long day at work?

The nearest ISOBAR

My husband and I purchased an old home in Northern New York State from two elderly sisters. Winter was fast approaching and I was concerned about the house's lack of insulation. "If they could live here all those years, so can we!" my husband confidently declared. One November night the temperature plunged to below zero, and we woke up to find interior walls covered with frost. My husband called the sisters to ask how they had kept the house warm. After a rather brief conversation, he hung up. "For the past 30 years," he muttered, "they've gone to Florida for the winter."

